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Modifying Fences to Prevent Ungulate Use of Cropland and High-Value Pastures

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Abstract: Big game can damage crops and compete with livestock for valuable forage. Ranchers have reported their tolerance for big game would increase if the animals could be prevented from using key areas critical for spring livestock use. Likewise, some farmers have high value areas that must be protected. Fences provide the most consistent long term control compared to other deterrent methods, but are costly to erect. Many designs of woven wire and electric fences are currently used. Costs of erecting deer proof fencing could be greatly reduced if an existing fence could be modified instead of being replaced entirely. This study investigates the possibility of modifying existing fences to prohibit deer and elk crossings. Preliminary results indicate effective modifications can be made to existing fences for $1300- $3500 per mile for materials. Traditional complete construction of game fences cost more than $10,000 per mile. These fences may be used in lieu of compensation programs for ranchers. Also, if farmers and ranchers can keep big game out of important foraging areas, their tolerance for these animals on the rest of their property may greatly increase.

Key Words: crop protection, damage, deer, elk, exclusion, fence, forage, modified fences

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INTRODUCTION

White-tailed deer (*Odocoileus virginianus)* mule deer (*O. hemionus*) and elk (*Cervus elaphus*) in southwest Montana and other areas of the intermountain west cause considerable monetary losses as perceived by some farmers and ranchers (Conover 1994, Wywialowski 1994, Irby et al. 1997). Big game animals caused an average monetary loss of $5616 in forage consumption per landowner in southwest Montana during 1993 (Lacey et al. 1993). Financial losses due to wildlife lowers landowner tolerance of wildlife on their property (Conover 1998). Compensation programs exist in some states to replenish losses accrued by ranchers to wildlife forage consumption, but these programs are increasingly costly and do not satisfy all producers (Van Tassel et al. 1999, Wagner et al. 1997).

Many methods of preventing damage by ungulates have been used including: chemical scents, frightening, hazing, trapping, and localized shooting. Results vary, and many of these methods provide only temporary relief with each application. Habitat alterations to encourage ungulate use of different areas can be effective but is often costly. Fences provide the most consistent long-term control compared to other deterrent methods, but are costly to erect (Craven 1983, deCalesta 1983). Many designs of woven wire and electric fences are currently used. Costs of erecting deer proof fencing could be greatly reduced if an existing fence can be modified instead of being replaced entirely. Modifying fences could be made a more cost effective means of controlling ungulate use.

This study investigated the possibility of modifying existing fences to prohibit deer and elk crossings. Currently, no literature exists on the effectiveness of such fences at deterring deer and elk. The objectives of this study were determine if tested fence modifications will effectively reduce the number of deer or elk that penetrate them.

METHODS AND MATERIALS

In 2002, pilot study and demonstration sites were chosen near Billings and Ennis, Montana in areas where damage to crops traditionally occur. To identify fence designs deserving more formal evaluation, 50 m sections of existing fences were augmented with high-tensile wire, woven wire, or polypropylene mesh. On all of these existing four-strand barbed-wire fences, fence posts were extended with fiberglass rods to achieve a height of 1.83 m. Four designs were installed. (1)Three strands of high-tensile wire alternated with existing barbed wire, and two strands extended above the existing fence attached to the fiberglass post extensions. (2)Were-enforced 50 m of existing fence with 1.19 m Max-Flex woven wire mesh (5 cm X 10 cm) and 3 strands of high-tensile wire on the extended fence posts. (3)We re-enforced one section of fence with 1.83 m high polypropylene mesh. Strength and durability was monitored periodically. Fence improvements were considered adequate and acceptable if fence sections withstood environmental conditions after 6 months. When we considered cost, labor and potential application on a large scale, the high tensile wire and net wire designs were selected for further testing and evaluation.

Formal testing of the high-tensile and net-wire designs is taking place on ranches in central and southwestern Montana. Four individual replication sites for deer and 4 for elk are being used. At each site, 5 standard 4 strand barbed wire fence exclosures were constructed. Exclosures were constructed in a line parallel to available cover with 10 m between each. Each exclosure was 9.75 m by 9.75 m. Corner and brace posts were constructed with a 5 m gap between each, and wires and fence stays were added. Four exclosures were then randomly modified to one of the four selected types, with the fifth left as a control. Modification 1 consisted of adding a single strand of 12 gauge high tensile wire between each existing wire and between the bottom wire and the ground. Three strands of 12 gauge high tensile wire were added above existing wire to bring the fence height to a total of 1.83 m. The second modification was exactly as the first, except for the bottom 4 strands of high tensile wire were electrified. Modification three had 1.19 m woven wire placed at ground level over the barbed wire, with three strands of 12 gauge high tensile wire strung above existing wire to bring the total height to 1.83 m. The fourth modification had .99 m woven wire placed at ground level over the barbed wire, with .81 m woven strung above to bring the total height to 1.80 meters.

Twelve bales (approximately 400 kg) of high quality alfalfa hay was then placed inside each exclosure as bait. Exclosures were monitored weekly to determine if deer or elk entered them. Necessary repairs were made to fences on a weekly basis, and hay was replenished as needed. Any breach was counted as a failure for that period of one week, and unbreached fences were counted as a success. Any deer or elk entering counted as a breach.

RESULTS

For the 2002 pilot study, construction time and costs associated with each fence type varied. Augmenting fence with high-tensile wire was the most economical at $1594/1.6 km, while strengthening fence with polypropylene mesh was the most expensive, at $5443/1.6 km. Supplementation of existing fence with a combination of net-wire and high-tensile wire cost approximately $3200/1.6 km. High tensile and net-wire modifications took the least amount of time to construct (105 man-hours/1.6 km) while polypropylene mesh was the most time-consuming installation (192 man-hours/1.6 km). Each fence type withstood environmental conditions, and showed no signs of penetration by deer or elk.

Based on the cost and potential for long-term, large scale use, 4 net-wire and/or high-tensile modification designs were selected for formal testing. The formal testing is between the first and second year so results are preliminary and represent only the first year data.

Given the number of test periods, 88 total breaches of each design were possible for both deer and elk during the first year of the study. For the designs in elk areas, the control was breached 21 times, the 7-wire non-electrified was breached 1 time, the woven wire with high-tensile above was breached 2 times and the 7-wire electric and full woven wire were not breached at all by elk. For the designs in the deer areas, the control was breached 55 times, the 7-wire non-electrified was breached 36 times, the 7-wire electrified was breached 26 times, the woven wire with high tensile was breached 4 times and the full woven wire fence was not breached at all by deer.

Cost of materials to modify an existing fence using the 7-wire non-electrified design cost approximately $1300/1.6 km. The same design with electrification cost $1500/1.6 km, the woven wire-high tensile combination cost $2600/1.6 km and the design made of all woven wire cost $3500/1.6 km.

MANAGEMENT IMPLICATIONS

Costs can be greatly reduced by modifying existing fences as opposed to constructing original fence. Traditional game proof fences cost more than $10,000/ 1.6 km. The cost to modify existing fences using the designs we tested cost much less at $1300- $3500/1.6 km. If these fences can be used as both a biologically and cost effective means of deterring deer and elk from grazing on pastures considered of high value to producers, such as irrigated or calving pastures, they may be used in lieu of compensation programs for ranchers. Also, if ranchers can keep deer and elk out of important foraging areas, their tolerance for these animals on the rest of their property may greatly increase.

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